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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/590,795	06/08/2000	Vishnu K. Agarwal	6047-53173	9849

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EXAMINER

VU, DAVID

ART UNIT	PAPER NUMBER
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2818

DATE MAILED: 03/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/590,795

Applicant(s)

AGARWAL ET AL.

Examiner

DAVID VU

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 December 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15, 19, 30, 32, 33, 41, 42 and 66-70 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15, 19, 30, 32, 33, 41, 42 and 66-70 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 June 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date. _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Species I (Claims 1-15, 19, 30, 32, 33, 41, 42 and 66-70) on 12/27/2005 is acknowledged.

Claims 3-9 and 11-24 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 12/27/2005.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-5, 14, 15, 19 and 30 are rejected under 35 U. S. C. 102(e) as being anticipated by Tanaka et al (US 6,355,492, herein after Tanaka).

Tanaka discloses a method of forming a ruthenium capacitor electrode (col. 2, lines 9-12) by reducing ruthenium oxide layer under a nitrogen gas at 1773K to obtain a Ru layer having an

average particle diameter of about 100,000Å (col. 6, lines 20-34); and annealing the rough-surfaced ruthenium layer in an oxidizing ambient (nitrogen/oxygen gas) to form passivated ruthenium layer (col. 6, lines 37-43; col. 7, lines 50-60 and col. 8, lines 15-18).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 6-13 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Tanaka et al. (US 6,355,492) in view of Yamauchi et al. (US 6,284,587, herein after Yamauchi).

Tanaka discloses a method of forming a ruthenium capacitor electrode (col. 2, lines 9-12) by reducing ruthenium oxide layer under a nitrogen gas at 1773K to obtain a Ru layer having an

average particle diameter of about 100,000Å (col. 6, lines 20-34); and annealing the rough-surfaced ruthenium layer in an oxidizing ambient to form passivated ruthenium layer (col. 6, lines 37-43; col. 7, lines 50-60 and col. 8, lines 15-18).

Tanaka fails to disclose the converting is performed at about 75 torr or less. However, Yamauchi teaches reducing ruthenium oxide layer under a nitrogen, He, Ne, Ar or Xe gas in 3 minutes (col. 3, line 66 through col. 4, line 12) at 6.5mTorr to obtain an amorphous Ru layer (col. 5, lines 23-52). It would have been obvious to one with ordinary skill in the art at the time of the invention to use the reducing ruthenium oxide condition as taught by Yamauchi in the process of Tanaka. The converting condition does not define patentable over Tanaka in view of Yamauchi since pressure is a well known processing variable and the discovery of the optimum or workable range involves only routine skill in the art. The specific pressure does not provide any critical or unexpected results to the method of manufacturing a conductive layer. Rather, it is merely an obvious selection of the pressure based on desired functional characteristics determinable by routine experimentation. In *Aller*, the court stated, "Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456 105 USPQ 233,235 (CCPA 1995).

4. Claims 32, 33, 41, 42 and 66-69 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Tanaka (US Pat. 6,355,492).

Tanaka discloses a method of forming a capacitor (see EXAMPLE 3) comprising: forming a layer of conducting material 21 (col. 9, lines 1-5); a Ru lower electrode 22A (col. 9,

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lines 5-8); a high k dielectric layer 23A (ferroelectrics layer) and a RuO₂ upper electrode 24A (col. 10, lines 40-64).

Tanaka fails to disclose the Ru lower electrode is formed by converting the ruthenium oxide to ruthenium layer. Tanaka also discloses reducing ruthenium oxide layer under a nitrogen gas at 1773K to obtain a Ru layer having an average particle diameter of about 100,000Å (col. 6, lines 20-34 and EXAMPLE 1). It would have been obvious to one of ordinary skill in the art at the time the invention was made for forming the Ru electrode layer as taught by EXAMPLE 1 instead of EXAMPLE 3 because it would have been mere substitution of art-recognized equivalent process for forming the Ru electrode in a method of manufacturing a capacitor.

5. Claim 70 is rejected under 35 U.S.C. 103 (a) as being unpatentable over Tanaka (US Pat. 6,355,492) in view of Kiyotoshi et al. (US Pat. 6,091,099, herein after Kiyotoshi).

Tanaka fails to disclose the electrode is defined by chemical mechanical polishing. However, Kiyotoshi teaches in col. 9, lines 65-67 and fig. 4C, the Ru film 213 is patterned by a chemical mechanical polishing to form a lower electrode of a capacitor. It would have been obvious to one of ordinary skill in the art at the time the invention was made for forming the capacitor electrode layer as taught by Kiyotoshi in process for fabrication of Tanaka since patterned by a chemical mechanical polishing is recognized equivalent process for forming the electrode in a method of manufacturing a capacitor.

Response to Arguments

6. Applicant's arguments with respect to claims 1-15, 19, 30, 32, 33, 41, 42 and 66-70 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Vu whose telephone number is (571) 272-1798. The examiner can normally be reached on Monday-Friday from 8:00am to 5:00pm. If attempt to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on (571) 272-1787. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR, Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



DAVID VU
PRIMARY EXAMINER